

## CLAIMS

What is claimed is:

1. A pelleted thermoplastic composite, comprising:
  - 2 a matrix of recycled thermoplastic comprising at least one of the group consisting of
  - 3 polyethylene, polypropylene, nylon, PET and styrene-butadiene rubber; and
  - 4 a plurality of high-modulus reinforcing fibers, said reinforcing fibers comprising at least one
  - 5 of the group consisting of glass fibers, natural fibers, carbon fibers, and aramid fibers, each of said
  - 6 reinforcing fibers having a minimum modulus of one million psi; said matrix of thermoplastic and
  - 7 said reinforcing fibers forming pellets.
2. The pelleted thermoplastic composite of claim 1, wherein said thermoplastic is derived from carpet and said reinforcing fibers comprise glass fibers in a weight percentage of about 20% to 70%.
3. The pelleted thermoplastic composite of claim 1, wherein said thermoplastic contains at least some amount of non-recycled material.
- 1 4. The pelleted thermoplastic composite of claim 1, wherein said natural fibers comprise at 2 least one of the group consisting of cotton, kenaf, sisal and hemp fibers.

1       5.     The pelleted thermoplastic composite of claim 1, wherein said thermoplastic composite is a  
2     substantially homogeneous combination of thermoplastic and reinforcing fibers, such that said  
3     reinforcing fibers are completely wet out.

1       6.     The pelleted thermoplastic composite of claim 1, wherein said thermoplastic composite has  
2     said reinforcing fibers aligned substantially in a first direction.

1       7.     The pelleted thermoplastic composite of claim 6, wherein a length of each of said pellets of  
2     thermoplastic composite is at least 1/2 inch, such that lengths of said reinforcing fibers in the first  
3     direction are approximately 1/2 inch.

1       8.     The pelleted thermoplastic composite of claim 6, wherein a width of each said pellets of  
2     thermoplastic composite is between 1/8 inch and 1/4 inch.

1       9.     The pelleted thermoplastic composite of claim 1, wherein up to 10 percent by weight of said  
2     thermoplastic comprises an adhesion promoter for bonding said thermoplastic to said reinforcing  
3     fibers.

1       10.    The pelleted thermoplastic composite of claim 9, wherein said adhesion promoter is a graft  
2     copolymer of malic anhydride with polypropylene.

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1        11. A method of forming a thermoplastic composite, comprising:  
2                providing recycled thermoplastic comprising at least one of the group consisting of  
3                ~~polyethylene, polypropylene, nylon, PET and styrene-butadiene rubber;~~  
4                providing high-modulus reinforcing fibers;  
5                combining said thermoplastic with said reinforcing fibers; and  
6                extruding said thermoplastic and said reinforcing fibers through a die to form the  
7                thermoplastic composite.

1        12. The method of claim 11, wherein the providing reinforcing fibers step comprises providing  
2                reinforcing fibers of a substantially continuous length.

1        13. The method of claim 11, wherein the providing reinforcing fibers step comprises providing  
2                reinforcing fibers having a predetermined length of at least approximately 1/2 inch.

1        14. The method of claim 11, wherein the providing reinforcing fibers step comprises preheating  
2                said reinforcing fibers.

1        15. The method of claim 11, wherein the thermoplastic composite contains at least some  
2                amount of non-recycled material.

1        16. The method of claim 11, wherein the combining step comprises mixing said thermoplastic  
2                continuously with said reinforcing fibers, such that said reinforcing fibers are completely wet out by  
3                said thermoplastic.

1       17. The method of claim 16, wherein the combining step comprises mixing said thermoplastic  
2 continuously with said reinforcing fibers such that a resultant thermoplastic composite is  
3 substantially uniformly mixed.

1       18. The method of claim 11, wherein the extruding step comprises extruding said thermoplastic  
2 composite into a continuous composite bar; and  
3                   further comprising cutting said composite bar to a desired length.

1       19. The method of claim 18, further comprising using at least a portion of said composite bar to  
2 manufacture at least one of a molded and a shaped product.

1       20. The method of claim 18, further comprising cutting said composite bar to a length of at least  
2 approximately 1/2 inch to form a product preform.

1       21. The method of claim 20, further comprising placing said product preform in a compression  
2 press and matched die mold; and  
3                   forming a molded composite product from the product preform.

1       22. The method of claim 18, wherein the extruding step comprises extruding said thermoplastic  
2 composite such that a width of said composite bar is between approximately 1/8 inch and  
3 approximately 1/4 inch.

1       23. The method of claim 11, further comprising using the thermoplastic composite to  
2 manufacture at least one of a molded and a shaped product.

1       24. The method of claim 11, wherein the providing thermoplastic step comprises plasticating  
2 extrusion of said thermoplastic such that said thermoplastic is molten.

1       25. The method of claim 24, wherein the providing thermoplastic step comprises relatively high  
2 shear stress plasticating extrusion of said thermoplastic.

1       26. The method of claim 11, wherein the providing high-modulus reinforcing fibers step  
2 comprises providing reinforcing fibers that are configured to a predetermined length of at least 1/2  
inch before combining said reinforcing fibers with said thermoplastic.

1       27. The method of claim 11, wherein the combining said thermoplastic and said reinforcing  
2 fibers step is accomplished in a single, low shear mixing extruder, such that breakage of reinforcing  
fibers during mixing with thermoplastic is reduced.

1       28. The method of claim 27, wherein the thermoplastic is sufficiently plasticized in a relatively  
2 high shear extruder before combining with said reinforcing fibers in said low shear mixing extruder.

1       29. The method of claim 11, wherein the combining said thermoplastic and said reinforcing  
2 fibers step is accomplished in a two-stage extruder having a high shear zone, wherein the  
3 thermoplastic is plasticized, and a low shear zone, wherein the reinforcing fibers are added and  
4 mixed with said thermoplastic.